WEST Search History

DATE: Thursday, March 21, 2002

Set Name side by side	Query	Hit Count	Set Name result set
DB=USPT,JPAB,EPAB,DWPI,TDBD; PLUR=YES; OP=OR			
L3	liposome$ same ionizing	43	L3
L2	biosorb	18	L2
L1	biosorb same ionizing	0	L1

END OF SEARCH HISTORY

L1: Entry 14 of 20 File: USPT Jan 31, 1989

US-PAT-NO: 4801459
DOCUMENT-IDENTIFIER: US 4801459 A

TITLE: Technique for drug and chemical delivery

DATE-ISSUED: January 31, 1989

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Liburdy; Robert P.	Tiburon	CA	94920	

US-CL-CURRENT: 604/20; 264/4.3, 424/450, 428/402.2, 436/829, 600/2, 604/114, 604/23

CLAIMS:

I claim:

1. A method of delivering a chemical agent to a preselected area of a body, comprising the steps of:

(a) encapsulating said chemical agent within a liposome, said liposome having a predetermined phase transition temperature at which said liposome is capable of releasing said chemical agent;

(b) injecting said liposome into the blood stream of said body; and

(c) subjecting said preselected area of said body to nonionizing electromagnetic fields without heating said preselected area of said body to said predetermined phase transition temperature in order to release said chemical agent from said liposome by nonthermal means at a temperature below said predetermined phase transition temperature.

2. A method of delivering a chemical agent to a preselected area of a body as defined in claim 1 further comprising the step of ensuring that said liposome is impermeable prior to subjecting said liposome to said electromagnetic fields.

3. A method of delivering a chemical agent to a preselected area of a body as defined in claim 2 wherein said electromagnetic fields are in the range of 26-2450 MHz.

4. A method of delivering a chemical agent to a preselected area of a body as defined in claim 3 wherein said preselected area of said body is subjected to said electromagnetic fields for periods of time as short as one second and at a power of approximately 60 mW/gram of tissue at said preselected area of said body.

5. A method of delivering a chemical agent to a preselected area of a body as defined in claim 4 wherein said liposome is a unilamellar vesicle.

6. A method of delivering a chemical agent to a preselected area of a body as defined in claim 5 wherein said unilamellar vesicle is made up of 4:1 weight combination of dipalmitoylphosphatidylcholine and dipalmitoylphosphatidylglycerol prepared in a physiological buffer.

7. A method of delivering a chemical agent to a preselected area of a body as defined

in claim 1 wherein said release of said chemical agent is enhanced by injecting serum into said preselected area of said body.

8. A method of delivering a chemical agent to a preselected area of a body as defined in claim 1 wherein said release of said chemical agent is enhanced by introducing oxygen into said preselected area of said body.

9. A method of delivering a chemical agent to a preselected area of said body as defined in claim 8 wherein said release of said chemical agent is enhanced by injecting serum into said preselected area of said body.

10. A method of delivering a chemical agent to a preselected area of a body, comprising the steps of:

(a) encapsulating said chemical agent within a liposome, said liposome having a predetermined phase transition temperature at which said liposome is capable of releasing said chemical agent;

(b) injecting said liposome into a preselected tissue of said body; and

(c) subjecting said preselected tissue of said body to nonionizing electromagnetic fields without heating said tissue to said predetermined phase transition temperature in order to release said chemical agent from said liposome by nonthermal means at a temperature below said predetermined phase transition temperature.

11. A method of delivering a chemical agent to a preselected area of said body as defined in claim 10 further comprising the step of ensuring that said liposome is impermeable prior to subjecting said liposome to said electromagnetic fields.

12. A method of delivering a chemical agent to a preselected area of a body as defined in claim 11 wherein said electromagnetic fields are in the range of 26.gtoreq.2450 MHz.

13. A method of delivering a chemical agent to a preselected area of a body as defined in claim 12 wherein said preselected area of said body is subjected to said electromagnetic fields for periods of time as short as one second and at a power of approximately 60 mW/gram of tissue at said preselected area of said body.

14. A method of delivering a chemical agent to a preselected area of said body as defined in claim 13 wherein said liposome is a unilamellar vesicle.

15. A method of delivering a chemical agent to a preselected area of a body as defined in claim 14 wherein said unilamellar vesicle is made up of 4:1 weight combination of dipalmitoylphosphatidylcholine and dipalmitoylphosphatidylglycerol prepared in a physiological buffer.

16. A method of delivering a chemical agent to a preselected area of said body as defined in claim 10 wherein said release of said chemical agent is enhanced by injecting serum into said preselected area of said body.

17. A method of delivering a chemical agent to a preselected area of said body as defined in claim 10 wherein said release of said chemical agent is enhanced by introducing oxygen into said preselected area of said body.

18. A method of delivering a chemical agent to a preselected area of said body as defined in claim 17 wherein said release of said chemical agent is enhanced by injecting serum into said preselected area of said body.

WEST

Generate Collection Print

L1: Entry 13 of 20 File: USPT Aug 29, 1989

US-PAT-NO: 4861521
DOCUMENT-IDENTIFIER: US 4861521 A

TITLE: Polymerizable liposome-forming lipid, and method for production thereof

DATE-ISSUED: August 29, 1989

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Suzuki; Kazuhiko	Fujinomiya			JPX
Yoshioka; Hiroshi	Fujinomiya			JPX

US-CL-CURRENT: 554/80; 204/157.44, 554/82, 987/233

CLAIMS:

What is claimed is:

1. A polymerizable liposome-forming lipid represented by the general formula I: ##STR7## wherein R stands for --CH.sub.2).sub.2 N.sup..sym. (CH.sub.3).sub.3.

2. A method for the production of a polymerizable liposome-forming lipid represented by formula I: ##STR8## wherein R stands --CH.sub.2).sub.2 N.sup..sym. (CH.sub.3).sub.3, said method comprising esterifying 100 parts by weight of a hydrolyzate of phosphatidyl choline, cephalin or phosphatidyl serine with 200 to 400 parts by weight of tung oil fatty acid containing at least 60% by weight of oleostearic acid in the form of an acid anhydride at a temperature in the range of 15.degree. to 25.degree. C.

3. The method according to claim 2, wherein said hydrolyzate is a hydrolyzate of phosphatidyl choline.

4. A method according to claim 2, wherein said hydrolyzate of phosphatidyl choline is the hydrolyzate of egg yolk lecithin.

WEST

Generate Collection | Print

Search Results - Record(s) 1 through 20 of 20 returned.

☐ 1. Document ID: US 6333314 B1

L1: Entry 1 of 20 File: USPT Dec 25, 2001

US-PAT-NO: 6333314
DOCUMENT-IDENTIFIER: US 6333314 B1

TITLE: Liposomes containing oligonucleotides

DATE-ISSUED: December 25, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kasid; Usha	Rockville	MD		
Gokhale; Prafulla	McLean	VA		
Dritschilo; Anatoly	Bethesda	MD		
Rahman; Aquilur	Long Grove	IL		

US-CL-CURRENT: 514/44; 435/455, 435/6, 435/91.1, 536/23.1, 536/24.5

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. Desc | Image

☐ 2. Document ID: US 6312720 B1

L1: Entry 2 of 20 File: USPT Nov 6, 2001

US-PAT-NO: 6312720
DOCUMENT-IDENTIFIER: US 6312720 B1

TITLE: Liposomal recombinant human superoxide-dismutase for the treatment of peyronie's disease

DATE-ISSUED: November 6, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Katinger; Hermann	Vienna			ATX
Vorauer-Uhl; Karola	Vienna			ATX
Riedl; Claus	Tribusinkel			ATX

US-CL-CURRENT: 424/450; 424/94.4, 435/189

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. Desc | Image

☐ 3. Document ID: US 6126965 A

L1: Entry 3 of 20 File: USPT Oct 3, 2000

US-PAT-NO: 6126965
DOCUMENT-IDENTIFIER: US 6126965 A

TITLE: Liposomes containing oligonucleotides

DATE-ISSUED: October 3, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kasid; Usha	Rockville	MD		
Gokhale; Prafulla	McLean	VA		
Dritschilo; Anatoly	Bethesda	MD		
Rahman; Aquilur	Long Grove	IL		

US-CL-CURRENT: 424/450; 436/71, 436/829, 536/23.1, 536/24.5

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

☐ 4. Document ID: US 6022560 A

L1: Entry 4 of 20 File: USPT Feb 8, 2000

US-PAT-NO: 6022560
DOCUMENT-IDENTIFIER: US 6022560 A

TITLE: Pharmaceutical compositions, novel uses, and novel form of .alpha.-tocopherylphosphocholine

DATE-ISSUED: February 8, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Yazdi; Parvin T.	Madison	WI		
Pruss; Thaddeus P.	Madison	WI		

US-CL-CURRENT: 424/450; 424/43, 424/451, 424/464, 514/458, 514/78

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

☐ 5. Document ID: US 5942245 A

L1: Entry 5 of 20 File: USPT Aug 24, 1999

US-PAT-NO: 5942245
DOCUMENT-IDENTIFIER: US 5942245 A

TITLE: Application of SOD in liposomes

DATE-ISSUED: August 24, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Katinger; Hermann	Wien			ATX
Vorauer-Uhl; Karola	Wien			ATX
Furnschlief; Eckhard	Wien			ATX

US-CL-CURRENT: 424/450; 424/94.4, 435/189

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

---

☐ 6. Document ID: US 5585363 A

L1: Entry 6 of 20 File: USPT Dec 17, 1996

US-PAT-NO: 5585363
DOCUMENT-IDENTIFIER: US 5585363 A

TITLE: Circumvention of human tumor drug resistance

DATE-ISSUED: December 17, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Scanlon; Kevin J.	Pasadena	CA		
Sowers; Lawrence C.	Duarte	CA		

US-CL-CURRENT: 514/45; 424/450, 514/256, 514/263.38, 514/46, 514/49, 514/50

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

---

☐ 7. Document ID: US 5552158 A

L1: Entry 7 of 20 File: USPT Sep 3, 1996

US-PAT-NO: 5552158
DOCUMENT-IDENTIFIER: US 5552158 A

TITLE: Skin care composition

DATE-ISSUED: September 3, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Evans; David A.	Edmonton			CAX
Nguyen; Uy	Edmonton			CAX

US-CL-CURRENT: 424/450; 424/401, 424/59, 424/745, 424/746, 514/844, 514/846, 514/847, 514/887

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
Draw Desc | Image

☐ 8. Document ID: US 5358752 A

L1: Entry 8 of 20 File: USPT Oct 25, 1994

US-PAT-NO: 5358752
DOCUMENT-IDENTIFIER: US 5358752 A

TITLE: Skin care composition

DATE-ISSUED: October 25, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Evans; David A.	Edmonton			CAX
Nguyen; Uy	Edmonton			CAX

US-CL-CURRENT: 424/450; 424/401, 424/59, 514/844, 514/846, 514/847, 514/887

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
Draw Desc | Image

☐ 9. Document ID: US 5352458 A

L1: Entry 9 of 20 File: USPT Oct 4, 1994

US-PAT-NO: 5352458
DOCUMENT-IDENTIFIER: US 5352458 A

TITLE: Tanning method using DNA repair liposomes

DATE-ISSUED: October 4, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Yarosh; Daniel B.	Merrick	NY		

US-CL-CURRENT: 424/450; 424/401, 424/59, 435/174, 435/175, 435/177, 435/182

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
Draw Desc | Image

☐ 10. Document ID: US 5302389 A

L1: Entry 10 of 20 File: USPT Apr 12, 1994

US-PAT-NO: 5302389
DOCUMENT-IDENTIFIER: US 5302389 A

TITLE: Method for treating UV-induced suppression of contact hypersensitivity by

administration of T4 endonuclease

DATE-ISSUED: April 12, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kripke; Margaret L.	Kingwood	TX		
Yarosh; Daniel B.	Merrick	NY		

US-CL-CURRENT: 424/94.6; 424/450, 424/94.3

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

---

☐ 11. Document ID: US 4933114 A

L1: Entry 11 of 20 File: USPT Jun 12, 1990

US-PAT-NO: 4933114
DOCUMENT-IDENTIFIER: US 4933114 A

TITLE: Polyacetylenic lipids, radiation-sensitive compositions, photographic elements and processes relating to same

DATE-ISSUED: June 12, 1990

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
O'Brien; David F.	Rochester	NY		
Whitesides; Thomas H.	Rochester	NY		
Klingbiel; Richard T.	Rochester	NY		

US-CL-CURRENT: 554/80; 554/110, 554/224, 554/79, 554/96

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

---

☐ 12. Document ID: US 4863740 A

L1: Entry 12 of 20 File: USPT Sep 5, 1989

US-PAT-NO: 4863740
DOCUMENT-IDENTIFIER: US 4863740 A

TITLE: Interleukin therapy

DATE-ISSUED: September 5, 1989

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kissel; Thomas	Ehrenkirchen			DEX
Reinhardt; Jurg	Ehrenkirchen			DEX
Schrank; Henriette	Riehen			CHX

US-CL-CURRENT: 424/450; 424/85.1

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
Draw Desc | Image

☐ 13. Document ID: US 4861521 A

L1: Entry 13 of 20 File: USPT Aug 29, 1989

US-PAT-NO: 4861521
DOCUMENT-IDENTIFIER: US 4861521 A

TITLE: Polymerizable liposome-forming lipid, and method for production thereof

DATE-ISSUED: August 29, 1989

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Suzuki; Kazuhiko	Fujinomiya			JPX
Yoshioka; Hiroshi	Fujinomiya			JPX

US-CL-CURRENT: 554/80; 204/157.44, 554/82, 987/233

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
Draw Desc | Image

☐ 14. Document ID: US 4801459 A

L1: Entry 14 of 20 File: USPT Jan 31, 1989

US-PAT-NO: 4801459
DOCUMENT-IDENTIFIER: US 4801459 A

TITLE: Technique for drug and chemical delivery

DATE-ISSUED: January 31, 1989

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Liburdy; Robert P.	Tiburon	CA	94920	

US-CL-CURRENT: 604/20; 264/4.3, 424/450, 428/402.2, 436/829, 600/2, 604/114, 604/23

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
Draw Desc | Image

☐ 15. Document ID: US 4590060 A

L1: Entry 15 of 20 File: USPT May 20, 1986

US-PAT-NO: 4590060

DOCUMENT-IDENTIFIER: US 4590060 A

TITLE: Agent facilitating liposome cellular wall transport, a method for the production thereof and its use

DATE-ISSUED: May 20, 1986

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ehrenfeld; Udo	8400 Regensburg			DEX

US-CL-CURRENT: 424/1.13; 206/569, 206/570, 422/61, 424/1.21, 568/449, 568/471

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

---

☐ 16. Document ID: US 4314021 A

L1: Entry 16 of 20 File: USPT Feb 2, 1982

US-PAT-NO: 4314021
DOCUMENT-IDENTIFIER: US 4314021 A

TITLE: Photographic element having a layer of lipid compound

DATE-ISSUED: February 2, 1982

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
O'Brien; David F.	Rochester	NY		
Whitesides; Thomas H.	Rochester	NY		
Klingbiel; Richard T.	Rochester	NY		

US-CL-CURRENT: 430/270.1; 430/286.1, 430/287.1, 430/905, 522/171, 522/173

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

---

☐ 17. Document ID: US 5302389 A

L1: Entry 17 of 20 File: EPAB Apr 12, 1994

PUB-NO: US005302389A
DOCUMENT-IDENTIFIER: US 5302389 A
TITLE: Method for treating UV-induced suppression of contact hypersensitivity by administration of T4 endonuclease

PUBN-DATE: April 12, 1994

INVENTOR-INFORMATION:

NAME	COUNTRY
KRIPKE, MARGARET L	US
YAROSH, DANIEL B	US

INT-CL (IPC): A61K 37/22; A61K 37/54
EUR-CL (EPC): A61K007/00; A61K007/42, A61K009/127 , A61K007/42 , A61K038/46

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

---

☐ 18. Document ID: WO 200139744 A2, AU 200124276 A

L1: Entry 18 of 20 File: DWPI Jun 7, 2001

DERWENT-ACC-NO: 2001-496537
DERWENT-WEEK: 200154
COPYRIGHT 2002 DERWENT INFORMATION LTD
TITLE: Radiation sensitive liposomes, useful as carriers for therapeutic and diagnostic agents, e.g. in the diagnosis and treatment of cancer

INVENTOR: BONDURANT, B; MCGOVERN, K A ; O'BRIEN, D F ; SUTHERLAND, R M

PRIORITY-DATA: 1999US-168100P (November 30, 1999)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
WO 200139744 A2	June 7, 2001	E	049	A61K009/00
AU 200124276 A	June 12, 2001		000	A61K009/00

INT-CL (IPC): A61 K 9/00

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

---

☐ 19. Document ID: US 5585363 A

L1: Entry 19 of 20 File: DWPI Dec 17, 1996

DERWENT-ACC-NO: 1997-064350
DERWENT-WEEK: 199846
COPYRIGHT 2002 DERWENT INFORMATION LTD
TITLE: Treatment of resistance to tumour cells to, e.g. cisplatin - by admin. of nucleoside analogue, e.g. AZT, which can act as suicide substrate to inhibit DNA replication and repair

INVENTOR: SCANLON, K J; SOWERS, L C

PRIORITY-DATA: 1991US-0741435 (August 5, 1991), 1987US-0046127 (May 5, 1987), 1988US-0234096 (August 19, 1988), 1989US-0421342 (October 13, 1989), 1989US-0436691 (November 15, 1989), 1989US-0447593 (December 8, 1989), 1990WO-US07155 (December 7, 1990), 1995US-0396068 (February 28, 1995)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
US 5585363 A	December 17, 1996		007	A61K031/70

INT-CL (IPC): A61 K 9/127; A61 K 31/395; A61 K 31/70

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWMC
Draw Desc | Clip Img | Image

☐ 20. Document ID: CA 2016667 C, WO 9002203 A, AU 8941976 A, EP 408675 A, CA 2016667 A, US 5085983 A, JP 04500458 W, NZ 233660 A, AU 633271 B, EP 408675 A4, EP 732409 A2, EP 408675 B1, DE 68928500 E, US 5736326 A, JP 10313880 A

L1: Entry 20 of 20 File: DWPI Jun 27, 2000

DERWENT-ACC-NO: 1990-099422
DERWENT-WEEK: 200043

TITLE: Detection of human tumour progression and drug resistance - by utilising changes in tumour cell RNA and DNA

INVENTOR: SCANLON, K J

PRIORITY-DATA: 1989US-0352994 (May 17, 1989), 1988US-0234096 (August 19, 1988), 1987US-0046127 (May 5, 1987), 1994US-0299332 (August 31, 1994)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
CA 2016667 C	June 27, 2000	E	000	C07H021/00
WO 9002203 A	March 8, 1990		063	
AU 8941976 A	March 23, 1990		000	
EP 408675 A	January 23, 1991		000	
CA 2016667 A	November 17, 1990		000	
US 5085983 A	February 4, 1992		000	
JP 04500458 W	January 30, 1992		011	
NZ 233660 A	December 23, 1992		000	G01N033/50
AU 633271 B	January 28, 1993		000	C12Q001/68
EP 408675 A4	December 29, 1993		000	
EP 732409 A2	September 18, 1996	E	000	C12Q001/68
EP 408675 B1	December 17, 1997	E	000	C12Q001/68
DE 68928500 E	January 29, 1998		000	C12Q001/68
US 5736326 A	April 7, 1998		025	C12P019/34
JP 10313880 A	December 2, 1998		011	C12N015/09

INT-CL (IPC): C07 H 15/12; C07 H 21/00; C07 H 21/04; C12 N 15/00; C12 N 15/09; C12 N 15/10; C12 N 15/11; C12 N 15/52; C12 P 19/34; C12 Q 1/02; C12 Q 1/68; G01 N 33/00; G01 N 33/50; G01 N 33/53; G01 N 33/566; G01 N 33/574

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWMC
Draw Desc | Clip Img | Image

Generate Collection | Print

Terms	Documents
radiation adj4 liposome$	20

Display Format: - Change Format

Previous Page Next Page

WEST

Generate Collection Print

L2: Entry 3 of 4 File: EPAB May 17, 1989

PUB-NO: GB002209468A
DOCUMENT-IDENTIFIER: GB 2209468 A
TITLE: Photosensitive liposomes

PUBN-DATE: May 17, 1989

INVENTOR-INFORMATION:

NAME	COUNTRY
MORGAN, CHRISTOPHER GRANT	

INT-CL (IPC): A61K 9/50; B01J 13/02
EUR-CL (EPC): A61K007/00; A61K009/127, A61K041/00

ABSTRACT:

Liposomes with an incorporated photosensitising agent or agents and which are such that absorption of light of the appropriate wavelength results in destabilisation of the lipid bilayer and fusion between liposomes and/or exchange of membrane bound constituents of the liposomes between liposomes and/or cells or tissues of a recipient of the liposomes and/or fusion of intact liposomes with such cells or tissues.

The liposomes are paticularly useful as vehicles for pharmaceutical or cosmetic compounds.

WEST

Generate Collection | Print

Search Results - Record(s) 1 through 4 of 4 returned.

☐ 1. Document ID: US 6103706 A

L2: Entry 1 of 4 File: USPT Aug 15, 2000

US-PAT-NO: 6103706
DOCUMENT-IDENTIFIER: US 6103706 A

TITLE: Methods for treating viral infections

DATE-ISSUED: August 15, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ben-Hur; Ehud	New York	NY		

US-CL-CURRENT: 514/63; 514/183, 514/185, 514/191

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw. Desc | Image

☐ 2. Document ID: US 6010890 A

L2: Entry 2 of 4 File: USPT Jan 4, 2000

US-PAT-NO: 6010890
DOCUMENT-IDENTIFIER: US 6010890 A

TITLE: Method for viral inactivation and compositions for use in same

DATE-ISSUED: January 4, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ben-Hur; Ehud	New York	NY		
Zuk; Maria M.	New York	NY		

US-CL-CURRENT: 435/173.3; 435/173.1, 435/2

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw. Desc | Image

☐ 3. Document ID: GB 2209468 A

L2: Entry 3 of 4 File: EPAB May 17, 1989

PUB-NO: GB002209468A
DOCUMENT-IDENTIFIER: GB 2209468 A
TITLE: Photosensitive liposomes

PUBN-DATE: May 17, 1989

INVENTOR-INFORMATION:

NAME	COUNTRY
MORGAN, CHRISTOPHER GRANT	

INT-CL (IPC): A61K 9/50; B01J 13/02
EUR-CL (EPC): A61K007/00; A61K009/127, A61K041/00

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
Draw. Desc | Image

☐ 4. Document ID: GB 2209468 A, GB 2209468 B

L2: Entry 4 of 4 File: DWPI May 17, 1989

DERWENT-ACC-NO: 1989-146989
DERWENT-WEEK: 198920
COPYRIGHT 2002 DERWENT INFORMATION LTD
TITLE: Photosensitive liposome(s) - incorporating photosensitising agents so absorption of light results in de-stabilisation of lipid bi:layer

INVENTOR: MORGAN, C G

PRIORITY-DATA: 1987GB-0021108 (September 8, 1987), 1988GB-0021105 (September 8, 1988)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
GB 2209468 A	May 17, 1989		019	
GB 2209468 B	November 13, 1991		000	

INT-CL (IPC): A61K 9/50; B01J 13/02

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
Draw. Desc | Image

Generate Collection | Print

Terms	Documents
photosensitive adj3 liposome$	4

Display Format: - Change Format

Previous Page Next Page

WEST

Generate Collection Print

L3: Entry 1 of 3 File: USPT Dec 8, 1992

DOCUMENT-IDENTIFIER: US 5169635 A
TITLE: Photoresponsive liposome

Abstract Paragraph Left (1):
A photoresponsive liposome which comprises a compound represented by the following general formula (I): ##STR1## wherein R.sub.1 is an alkyl group; R.sub.2, R.sub.3, R.sub.4 and R.sub.5, which may be the same or different, are selected from the group consisting of an alkyl group, a substituted alkyl group, an alkoxy group, a substituted alkoxy group, a halogen atom and a hydrogen atom; R.sub.6 and R.sub.7, which may be the same or different, are an alkyl group or a hydrogen atom; n is an integer of 1 to 2; and X represents a hydrophilic group, a hydrophobic group or a combination of hydrophilic and hydrophobic groups, bonded through a connecting group, provided that any of these hydrophilic and hydrophobic groups has such properties that the compound represented by the general formula (I) becomes available as a component forming the membrane of liposome.

Brief Summary Paragraph Right (1):
This invention relates to photoresponsive liposomes which are useful, especially, in the field of diagnostics, therapeutics, biochemistry and medical science. More particularly, this invention relates to a photoresponsive liposome prepared using a photoresponsive compound which contains a highly efficient photoreceptor group and is effective for controlling the amount of the content of liposomes released using light irradiation.

Brief Summary Paragraph Right (2):
Studies on artificial membranes and liposomes which respond to optical stimuli have been performed quite actively, in recent years. These studies have been directed in two main areas. That is, (1), embedding of photoresponsive groups into an oriented monomolecular film or dimeric film based, for example, on the reversible cistrans photoisomerization of azobenzenes (Chemistry Letters, p. 421, 1980) or on the conformational changes in photoresponsive proteins such as rhodopsin (J. Am. Chem. Soc., vol. 107, p. 7769, 1985) and (2) direct transfer of photoresponsive groups into liposome-forming lipids based, for example, on the covalent bonding of retinoic acid with a phospholipid (Photochemistry and Photobiology, vol. 37, p. 491, 1983) or on the covalent bonding of an o-nitrobenzyl group with a phospholipid (Chemistry Letters, p. 433, 1989).

Brief Summary Paragraph Right (5):
Therefore, an object of the present invention is to provide a photoresponsive liposome prepared using a photoresponsive compound which contains a highly efficient photoreceptor group and is effective for controlling using light irradiation the amount of the contents of a liposome.

Brief Summary Paragraph Right (6):
Thus, the present invention provides a photoresponsive liposome which comprises a compound represented by the following general formula (I): ##STR2## wherein R.sub.1 is an alkyl group; R.sub.2 R.sub.3, R.sub.4 and R.sub.5, which may be the same or different, are selected from the group consisting of an alkyl group, a substituted alkyl group, an alkoxy group, a substituted alkoxy group, a halogen atom and a hydrogen atom; R.sub.6 and R.sub.7, which may be the same or different, are an alkyl group or a hydrogen atom; n is an integer of 1 to 2; and X represents a hydrophilic group, a hydrophobic group or a combination of hydrophilic and hydrophobic groups,

bonded through a connecting group, provided that any of these hydrophilic and hydrophobic groups has such properties that the compound represented by the general formula (I) becomes available as a component forming the membrane of liposome (closed vesicles).

Detailed Description Paragraph Right (1):
The objects of the present invention are accomplished by a photoresponsive liposome which comprises a compound represented by the following general formula (I) as the photoresponsive material: ##STR3## wherein R.sub.1 is an alkyl group, preferably having 1 to 22 carbon atoms; R.sub.2, R.sub.3, R.sub.4 and R.sub.5, which may be the same or different, are selected from the group consisting of an alkyl group, a substituted alkyl group, an alkoxy group, a substituted alkoxy group, a halogen atom and a hydrogen atom; R.sub.6 and R.sub.7, which may be the same or different, are an alkyl group or a hydrogen atom; n is an integer of 1 to 2; and X represents a hydrophilic group, a hydrophobic group or a combination of hydrophilic and hydrophobic groups, bonded through a connecting group.

Detailed Description Paragraph Right (33):
Any well-known prior art technique, as well as a stable plerilamellar vesicle method (SPLV method) as described in S. M. Gruner et al. in Biochemistry (vol. 24, p. 2833, 1985), is useful for the production (preparation) of functional liposomes of the present invention. Examples of suitable prior art techniques which can be used for the production (preparation) of liposomes include a vortexing method, an ultrasonic treatment method, a surface active agent treatment method, a reverse phase evaporation method (REV method), an ethanol injection method, an ether injection method, a pre-vesicle method, a French press extrusion method, a Ca.sup.2+ fusion method, an annealing method, a freezing-thawing fusion method and a W/O/W emulsion method. In other words, the photoresponsive liposome of the present invention can be prepared using any of these prior art techniques or any other liposome-preparation method, except that the formation of liposomes is performed in the presence of the compound as represented by the general formula (I).

Detailed Description Paragraph Right (61):
Thus, it is apparent that the present invention provides a photoresponsive liposome prepared using a photoresponsive compound which contains a highly efficient photoreceptor group and is effective for controlling the amount of the contents of the liposomes released using light irradiation.

CLAIMS:

1. A photoresponsive liposome that lyres on exposure to light which comprises a photocleavable compound represented by the following general formula (I): ##STR14## wherein R.sub.1 is an alkyl group; R.sub.2, R.sub.3 R.sub.4 and R.sub.5 which may be the same or different, are selected from the group consisting of an alkyl group, a substituted alkyl group, an alkoxy group, a substituted alkoxy group, a halogen atom and hydrogen atom; R.sub.6 and R.sub.7, which may be the same or different, are an alkyl group or a hydrogen atom; n is an integer of 1 to 2; and X represent a hydrophilic group, a hydrophobic group or a combination of hydrophilic and hydrophobic groups, bonded through a connecting group, provided that any of these hydrophilic and hydrophobic groups has such properties that the compound represented by the general formula (I) becomes available as a component forming the membrane of liposome, wherein X is ##STR15## and wherein A is ##STR16## x and y each is 0 or 1 and m is an integer of 6 to 20.

2. The photoresponsive liposome of claim 1, wherein R.sub.1 is alkyl group having 1 to 22 carbon atoms.

3. The photoresponsive liposome of claim 1, wherein R.sub.2, R.sub.3, R.sub.4 and R.sub.5 are selected from the group consisting of an unsubstituted or substituted alkyl group having 1 to 22 carbon atoms, an unsubstituted or substituted alkoxy group having 1 to 22 carbon atoms, a halogen atom or a hydrogen atom.

4. The photoresponsive liposome of claim 1, wherein at least one of R.sub.6 and R.sub.7 is a hydrogen atom.

5. The photoresponsive liposome of claim 1, wherein the compound of the formula (I) has a hydrophilic/lipophilic balance ranging from 2 to 18.

6. The photoresponsive liposome of claim 1, wherein the liposome contains therein at least one agent selected from the group consisting of a carcinostatic agent, an anti-viral agent, an antibiotic agent, a peptide hormone, an enzyme, an immunopotentiator, a immunoglobulin and a toxin.

WEST

End of Result Set

Generate Collection Print

L3: Entry 3 of 3 File: DWPI May 25, 1998

DERWENT-ACC-NO: 1991-248514
DERWENT-WEEK: 199826

TITLE: Photoresponsive liposome(s) - used for controlled release of active components by irradiation with light

Equival ent Abstract Text:
A photoresponsive liposome that lyres on exposure to light comprises a photocleavable cpd. (I) R1 is an alkyl group, R2,R3,R4 and R5, same or different, are selected from (substd.)alkyl gp. (substd.)alkoxy gp. halogen and H. R6 and R7 same or different, are alkyl or H, n is 1 to 2; and X is a hydrophilic group, a hydrophobic group or a combination of hydrophilic and hydrophobic groups, bonded through a connecting group, provided that any of these hydrophilic and hydrophobic groups has such properties that (I) becomes available as a component forming the membrane of liposome, X is -O-(C(O)y-(CH2)m-(C(O)x-O-B, -O-D or -O-C(O)-(VH2)m-C(O)-NH-E and A is (i)-(iv) B is (i) or (v) D is (vi) or (vii) E is (vii) or (ix). x and y each is 0 or 1 and m is 6 to 20.

Standard Title Terms:
PHOTORESPONSIVE LIPOSOME CONTROL RELEASE ACTIVE COMPONENT IRRADIATE LIGHT

Title (1):
Photoresponsive liposome(s) - used for controlled release of active components by irradiation with light

Equivalent Abstract Text (1):
A photoresponsive liposome that lyres on exposure to light comprises a photocleavable cpd. (I) R1 is an alkyl group, R2,R3,R4 and R5, same or different, are selected from (substd.)alkyl gp. (substd.)alkoxy gp. halogen and H. R6 and R7 same or different, are alkyl or H, n is 1 to 2; and X is a hydrophilic group, a hydrophobic group or a combination of hydrophilic and hydrophobic groups, bonded through a connecting group, provided that any of these hydrophilic and hydrophobic groups has such properties that (I) becomes available as a component forming the membrane of liposome, X is -O-(C(O)y-(CH2)m-(C(O)x-O-B, -O-D or -O-C(O)-(VH2)m-C(O)-NH-E and A is (i)-(iv) B is (i) or (v) D is (vi) or (vii) E is (vii) or (ix). x and y each is 0 or 1 and m is 6 to 20.

Standard Title Terms (1):
PHOTORESPONSIVE LIPOSOME CONTROL RELEASE ACTIVE COMPONENT IRRADIATE LIGHT

WEST Search History

DATE: Thursday, March 21, 2002

Set Name side by side	Query	Hit Count	Set Name result set
DB=USPT,JPAB,EPAB,DWPI,TDBD; PLUR=YES; OP=OR			
L3	photoresponsive adj3 liposome$	3	L3
L2	photosensitive adj3 liposome$	4	L2
L1	radiation adj4 liposome$	20	L1

END OF SEARCH HISTORY

L5: Entry 15 of 115 File: USPT Oct 17, 2000

DOCUMENT-IDENTIFIER: US 6132764 A
TITLE: Targeted polymerized liposome diagnostic and treatment agents

Detailed Description Paragraph Right (53):
A lipid containing a fluorophore head group, such as, for example, Texas Red, was constructed. Suitable lipids are, for example, PDA(PEG).sub.3 -NH.sub.2 /carboxylic acids and hydraziene derivatives and suitable fluorophore head groups are, for example, Texas Red and FITC. This material was incorporated into polymerized liposomes at a level of 0.5%. 200 .mu.g Texas Red sulfonyl chloride in acetonitrile was added to 600 .mu.l polymerized liposomes, 30 mM in acyl chain, on 0.01M sodium bicarbonate buffer, pH9, and reacted at room temperature for 2 hours. The labeled polymerized liposomes were then purified by gel filtration (Sephadex G-25, Sigma, St. Louis, Mo.) using PBS as eluent. An anti-ICAM-1 antibody was then attached to the Texas Red labelled polymerized liposomes in the same manner as described in Example IV and then incubated with activated endothelial cells expressing ICAM-1 and analyzed using fluorescent microscopy. Using this approach, 10.sup.5 to 10.sup.6 Texas Red molecules can be linked to each antibody resulting in dramatic increase in sensitivity of the assay. The antibody conjugated polymerized liposomes can be easily seen bound to the activated endothelium, thus simplifying the methodology for assaying cell surface glycoproteins.

Detailed Description Paragraph Right (63):
Cell-binding assays using fluorescently-tagged antibody-conjugated paramagnetic polymerized liposomes were conducted to show that the anti-ICAM-1 antibody-conjugated paramagnetic polymerized liposomes could recognize antigens in vitro. Paramagnetic polymerized liposomes, as prepared in Example VIII, were coupled to Texas Red flurophore (Pierce, Rockford, Ill.). 200 .mu.g Texas Red sulfonyl chloride in acetonitrile was added to 600 .mu.l paramagnetic polymerized liposomes, 30 mM in acyl chain, in 0.1M sodium bicarbonate buffer, pH 9, and reacted at room temperature for 2 hours. The labeled paramagnetic polymerized liposomes were then purified by gel filtration (Sephadex G-25, Sigma, St. Louis, Mo.) using PBS as eluent. Fluorescent paramagnetic polymerized liposomes were then conjugated to anti-ICAM-1 antibodies as described in the prior example.

L5: Entry 28 of 115 File: USPT Jun 22, 1999

DOCUMENT-IDENTIFIER: US 5914126 A
TITLE: Methods to deliver macromolecules to hair follicles

Detailed Description Paragraph Right (188):
Liposomes were prepared by sonication of about 15 mg or 25 mg, preferably 25 mg, phosphatidylcholine (PC) emulsion in phosphate buffered saline (PBS) containing about 20 mg/ml of the fluorescent dye calcein. Liposomes were also prepared by entrapping NBD-phosphatidylcholine fluorescent dye using an emulsion with about 20 mg/ml of the NBD formulation. Liposomes were separated from the non-entrapped dye by gel-filtration on a Sepharose 4B column diluted with phosphate buffered saline. The amount of entrapped dye was measured spectrofluorometrically. Two types of PC were used: egg PC (EPC) and dipalmitoyl PC (DPPC). Due to their phase transition temperatures, liposomes made of DPPC are in a gel phase at about 37.degree. C. while liposomes prepared from EPC are in a liquid-crystalline state.

Detailed Description Paragraph Right (197):
To that end, liposomes were prepared by sonication. About 20 mg of egg phosphatidycholine was rotary evaporated with a vacuum drier from a chloroform solution to form a thin film on the walls of a 5 ml round-bottomed flask for about 1 hour. The dried thin film phospholipid was suspended in about 0.5 ml phosphate buffered saline (pH 7.4) on a vortex mixer and then sonicated with a Branson probe-type sonicator fitted with a microtip at power level 3 for about 8 minutes. Then 0.5 ml of a solution of melanin (10 mg/ml) was entrapped with the above suspension by sonication for about an additional 4 minutes. Liposomes were separated from the non-entrapped melanin by gel-filtration on a Sepharose 4B column equilibrated with phosphate buffered saline.

WEST

Generate Collection Print

L5: Entry 38 of 115 File: USPT Sep 2, 1997

DOCUMENT-IDENTIFIER: US 5662931 A
TITLE: Process for preparing liposome composition

Detailed Description Paragraph Right (2):
The above prepared liposome composition was subjected to gel filtration as follows. Gel filtration was conducted using a column (1.0 cm diameter.times.18 cm length) packed with Sephacryl S-400 gel and equilibrated with a gelatin-containing tris buffer (pH 7.4). The liposome fractions that eluted at the void volume were collected.

WEST Search History

DATE: Thursday, March 21, 2002

Set Name side by side	Query	Hit Count	Set Name result set
DB=USPT,JPAB,EPAB,DWPI,TDBD; PLUR=YES; OP=OR			
L5	liposome$ adj5 (gel adj1 filtration)	115	L5
L4	liposome$ same (gel adj1 filtration)	385	L4
L3	photoresponsive adj3 liposome$	3	L3
L2	photosensitive adj3 liposome$	4	L2
L1	radiation adj4 liposome$	20	L1

END OF SEARCH HISTORY

L3: Entry 28 of 43 File: USPT Jul 25, 1995

DOCUMENT-IDENTIFIER: US 5436170 A
TITLE: Receptor membranes

Brief Summary Paragraph Right (2):
It is known that amphiphilic molecules may be caused to aggregate in solution to form two or three dimensional ordered arrays such as monolayers, micelles, black lipid membranes, and vesicles or liposomes, which vesicles may have a single compartment or may be of the multilamellar type having a plurality of compartments. It is also known that such amphiphilic molecules may be formed with cross-linkable moieties. Under appropriate stimulus, such as UV radiation or ionising radiation, the cross-linkable moieties can be caused to polymerize after the amphiphilic molecules have been caused to assume a suitably ordered two or three dimensional array. It is also known that suitable receptor molecules may be included in ordered arrays of amphiphilic molecules.

L3: Entry 22 of 43 File: USPT Oct 6, 1998

DOCUMENT-IDENTIFIER: US 5817856 A
TITLE: Radiation-protective phospholipid and method

Detailed Description Paragraph Right (21):
Oxidative stress tests were performed on egg PC liposomes containing 3 mole % of DHP-PEG.sup.2000, using two sources of oxidizing species: (i) ionizing .gamma. radiation and (ii) long term exposure to air and/or high temperature. Liposomes containing egg PC alone were subjected to the same conditions. As described in Examples 3-6 below, the liposomes containing the ether-linked PEG phospholipid showed a greatly reduced loss of unsaturated acyl chains in the egg PC, compared to that in liposomes of egg PC alone.

Detailed Description Paragraph Right (61):
Liposomes with and without DHP-PEG.sup.2000 were exposed to ionizing gamma radiation. The liposomes were analyzed for their acyl chain composition following the exposure as described in Materials and Methods. Three species of polyunsaturated fatty acids (PUFA) were monitored (18:2, 20:4, 22:6). FIGS. 5A-C show the ratio of unsaturated lipid to the saturated internal standard, palmitic acid (16:0), which is not affected by the irradiation. Liposome acyl chain composition prior to irradiation shows little or no difference in the fatty acid composition between the two types of liposomes, as is shown in FIGS. 5A-C in the control columns.

Detailed Description Paragraph Right (62):
Ionizing irradiation at a 1 Mrad dose caused a significant loss of the PUFA in all of the liposomes; however, the loss of acyl chains in liposomes containing the DHP-PEG.sup.2000 was significantly lower than in the liposomes composed of only egg phosphatidylcholine (FIGS. 5A-C). Each experiment was repeated six times. The average loss of 18:2, 22:4, 22:6 acyl chains in the EPC liposomes was 15%, 45% and 56% respectively, while the loss in the PEG-liposomes was 9%, 19% and 29% respectively. As expected, the loss of acyl chains increased with increasing degree of phospholipid acyl chain unsaturation for liposomes lacking and containing DHP-PEG.sup.2000. However, the level of oxidative damage was much higher for the vesicles lacking the PEG lipid.

L3: Entry 7 of 43 File: USPT Dec 12, 2000

DOCUMENT-IDENTIFIER: US 6159443 A
TITLE: X-ray guided drug delivery

Abstract Paragraph Left (1):
A method of delivering an active agent to a target tissue, particularly neoplastic tissue, vascular anomaly or tumor tissue, in a vertebrate subject. The method includes the steps of exposing the target tissue to ionizing radiation; and administering a delivery vehicle to the vertebrate subject before, after, during, or combinations thereof, exposing the target tissue to the ionizing radiation. The delivery vehicle includes the active agent and delivers the agent to the target tissue. Exemplary delivery vehicles include platelets; leukocytes; proteins or peptides which bind activated platelets; antibodies which bind activated platelets; microspheres coated with proteins or peptides which bind activated platelets; liposomes conjugated to platelets, leukocytes, proteins or peptides which bind activated platelets, or antibodies which bind activated platelets; and combinations thereof.

Detailed Description Paragraph Right (74):
Platelets are also loaded using the open channel system (OCS), receptor-mediated endocytosis using retention of liposomes, or reconstituted Sendai virus envelopes (RSVE). These techniques have been used to load chemotherapeutic agents such as adrimycin, cis-platinum and radioisotopes. Platelets are loaded by liposomes comprising chole steryl hexa decyesyl ether or chole steryl oleate. The liposome mediated platelet encapsulation is compared to electroporation using techniques described by Crawford, N., Semin. Intervent. Cardiol. 1:91-102 (1996). Platelets are also loaded with radiation sensitizing drugs in a similar manner for similar comparison. The loaded platelet delivery vehicles are then administered to a vertebrate subject and the target tissue is exposed to ionizing radiation via intersecting planes of irradiation in accordance with the methods of the present invention, including those set forth the foregoing Examples.

L3: Entry 3 of 43 File: USPT Jan 30, 2001

DOCUMENT-IDENTIFIER: US 6180135 B1
TITLE: Three-dimensional colorimetric assay assemblies

Detailed Description Paragraph Type 1 (12):
polymerization of the stirred liposome solution in a 1 cm quartz cuvette with a small 254 nm UV-lamp (pen-ray, energy: 1600 .mu.w/cm.sup.2) in a distance of 3 cm in a small chamber which is purged with nitrogen 20 minutes prior to and during the polymerization to replace all oxygen and to cool the sample; polymerization times vary between 5 and 30 minutes depending on the desired properties (color, polymerization degree) of the liposomes. Other organic solvent include benzene, alcohol, cyclohexane, hexanes, methylene chloride, acetonitrile, and carbontetrachloride. Other aqueous solutions include buffer solution, cell media, physiological saline, phosphate buffered saline, Trizma buffer, HEPES, and MOPS. Other inert gases include argon. Other polymerization means include gamma irradiation, electron beam or X-rays, or other low-energy ionizing sources. In one embodiment, the polymerization is continued until the liposomes are in the blue or purple phase. In some embodiments, the cooling step is conducted at temperatures between 4.degree. C. and -20.degree. C. for a period of time between 5 minutes and 5 hours. Polymerization can be accomplished by gamma radiation, electron beam, or X-rays.